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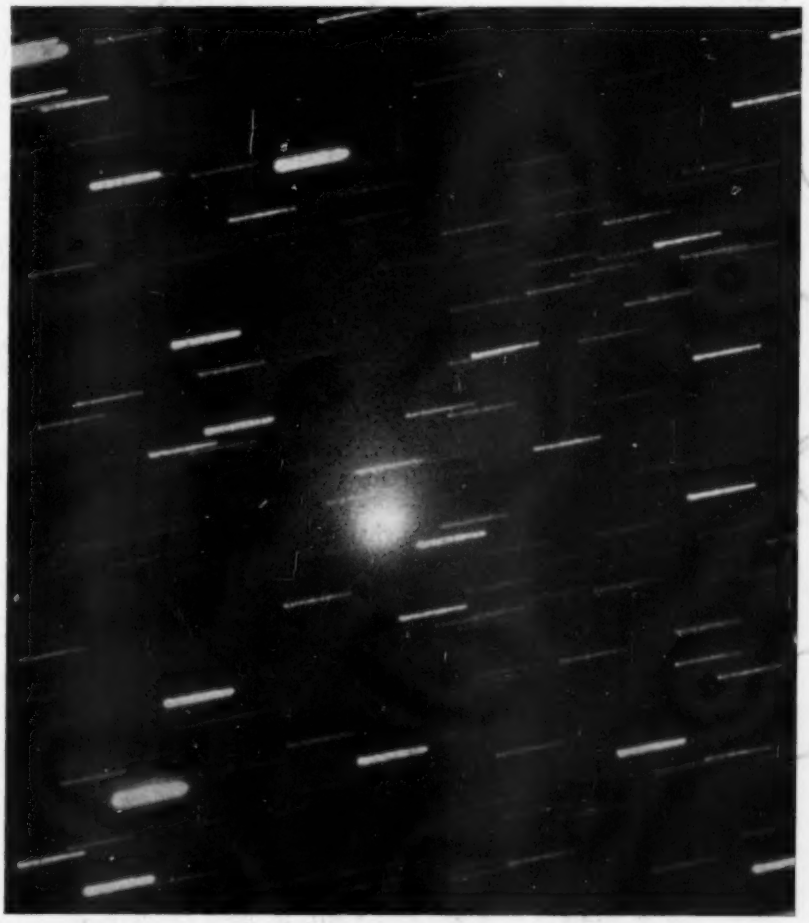
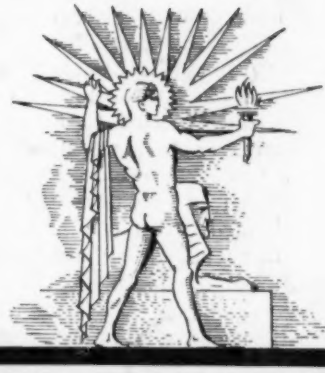
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •





November 16, 1940

Christmas "Star"

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A SCIENCE SERVICE PUBLICATION

Do You Know?

The Dutch were first to grow *pine-apples* in Europe.

In an average lifetime, a human *heart* beats two billion times.

Speeding up production, *nylon* yarn factories expect to turn out 16,000,000 pounds a year by the end of 1942.

The British Navy's newest motor *torpedo-boats* are described as fastest small warships in the world.

Dahlia roots, says an agricultural extensionist, are stored best in dry sand or peat moss, in a cool basement.

In 1782, Spain tried and failed to take Gibraltar by using a *secret weapon*—bomb-proof floating batteries.

While a *battleship* is 93% steel, its materials also include copper, lead, zinc, aluminum, cork, wood, asbestos, cement and glass.

When meadow mice destroy *pine trees,* they girdle the tree above ground; pine mice, on the other hand, usually work underground at the roots.

Among the Aranda tribe of Australia, says an anthropologist, a man is ordinarily expected to *marry* his mother's mother's brother's daughter's daughter.

A new *sewing thread* patented in the United States is said to be so smooth that it greatly reduces friction in passing through a fabric.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

ASTRONOMY

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What star became 20% brighter within one week? p. 313.

BOTANY

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CHEMISTRY

How much Scotch is required to give whisky the desirable smoky taste? p. 312.

CHEMISTRY—INVENTION

How do the Germans make gasoline from water-gas? p. 311.

ENGINEERING

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INVENTION

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MILITARY SCIENCE

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Why may solid shot be used instead of shell against tanks? p. 316.

NUTRITION

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PALEONTOLOGY

Where were the oldest wormholes discovered? p. 310.

PHYSICS

Where has evidence been found for a fourth series of radioactive elements? p. 310.

PHYSICS—FORESTRY

What new use has been found for the wind tunnel? p. 313.

PHYSIOLOGY

What grafting operation has made it easier to study the sex cycle? p. 318.

PUBLIC HEALTH

How long has the U. S. Department of Agriculture been battling bovine tuberculosis? p. 312.

A *soap* company is producing 17 varieties, to fit regions having water of varying degrees of hardness.

A fine collection of *moths,* which are attracted by airport lights, has been made by Austin McMahon, airport night watchman at Moncton, Canada.

A New York physician states that a young child's *appetite* naturally slumps when growth rate decreases in the second and third year.

China's military leaders are said to regard the war in their country as henceforth 30% military and 70% industrial.

A *polar bear,* says Dr. Roy Chapman Andrews, has partly webbed toes, and huge flat feet which serve both as paddles and snowshoes.

A British archaeologist finds alarming the extent to which defense measures have endangered or engulfed his country's ancient *earth monuments.*

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MEDICINE

Drag-Net on Childhood Foe Being Drawn in Closer

Physicians and Medical Scientists in Texas, California, Michigan, Canada, Chicago, Cleveland Battling Polio

A DRAG-NET has been spread right across the nation to catch that crippling, maiming and killing foe of children, infantile paralysis. The men who have spread the net are doctors and medical scientists working in laboratories and hospitals in Texas, California, Michigan, Canada, Chicago, Cleveland and other research centers. They have not yet outwitted the criminal but they are drawing the net closer, reports to the National Foundation for Infantile Paralysis in New York show.

Following the trail into the body of the virus that causes the disease, some of these scientists have swung away from the nose route and are apparently picking up a trail that leads into the body through the mouth. On this trail, Dr. John A. Toomey, of the Western Reserve University School of Medicine, has found a clue that may lead to solution of the mystery of why some persons get the disease while others do not. The reason, Dr. Toomey believes, has something to do with germs of an entirely different kind, the typhoid fever, paratyphoid fever and colon bacilli, which are germs of the intestinal tract.

These germs produce a toxin or poison which apparently increases the virulence of the infantile paralysis germ or virus. When the poison and the virus have been mixed together, the virus causes infantile paralysis in the cotton rat which ordinarily does not get infantile paralysis. Before Dr. Toomey's report, only one strain of infantile paralysis virus was found to attack these animals and make them sick, although many different strains make monkeys and humans sick with the disease. Dr. Toomey, however, has found that mixing the virus with the colon-typhoid-paratyphoid germs' poison gives to more than one infantile paralysis virus strain the power of producing the disease in cotton rats.

Clues to why some children can resist infantile paralysis, or have immunity to it, while others do not, have been sought on another trail by Dr. John F. Kessel, at the University of Southern California. Vaccination against the disease in the ordinary way of vaccinating is not likely to protect children from the disease, Dr. Kessel believes. He bases his views partly on the fact that both monkeys and humans can and do get second attacks of the disease. This seems to mean that resistance to this disease does not depend on the body being able to build up infantile-paralysis-fighting antibodies when the virus attacks, as it can build such antibodies for protection against attacks of other disease germs.

Protection against the disease is, therefore, not likely to be achieved by vaccinating with small doses of killed or weakened infantile paralysis virus. But the grandpa of all vaccines for protecting against disease, smallpox vaccine, was not made from smallpox virus, Dr. Kessel pointed out. It was made from the virus of another, very similar disease, cowpox. Protection against infantile paralysis might be possible, he suggested, if scientists could find a virus closely similar to the infantile paralysis virus, but unlike it in being harmless to humans. Viruses that cause sickness in mice by attacking their brains and central nervous systems, as the infantile paralysis virus does, have been studied, but none so far found has the power to confer immunity or resistance to the infantile paralysis virus.

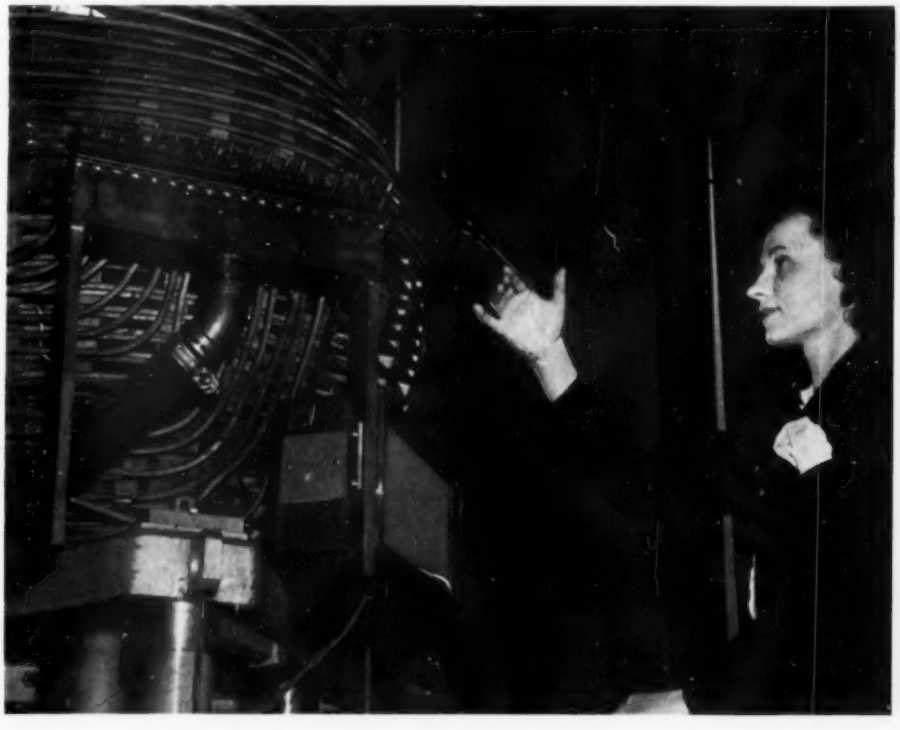
The next step which scientists are hoping to take is the discovery of this innocuous virus. At present, this detective story of medicine is like a serial story, "to be continued."

Science News Letter, November 16, 1940

New Kind of Protection

ENCOURAGING results in efforts to create a new kind of protection against infantile paralysis were reported by Dr. Harold K. Faber and associates of Stanford University School of Medicine at the meeting of the National Foundation for Infantile Paralysis in New York.

The new kind of vaccination is aimed at protecting the central nervous system



DEFIES LAW OF GRAVITY

This ordinary screwdriver is held in space on the fingertip of a visitor to the Westinghouse laboratories by magnetic lines of force from the ball-shaped mass spectrometer. This sorting machine for molecules and their constituent atoms divides them according to mass as they travel at some 16,000 miles a minute.

Science News Letter, November 16, 1940

where the virus of the disease does its damage. Previous efforts at vaccination against infantile paralysis have failed, it is generally believed, because the vaccine reached the blood cells, but not the cells of the central nervous system where it was needed to combat the virus. Vaccines against other diseases succeed when they cause an increase in germ-fighting substances in the blood.

Dr. Faber and associates have been trying to produce immunity to infantile paralysis by applying killed infantile paralysis virus directly to the cells of the central nervous system.

"Results to date offer encouragement," although the studies have not progressed far enough to allow for an evaluation. Dr. Faber and associates have, however, been able to produce considerable penetration of the dye, Prussian blue, into the central nervous system, and it may be possible by the same method to get the vaccine into the central nervous system.

Science News Letter, November 16, 1940

Tonsils Lessen Risk

A CHILD who has had his tonsils removed is in greater danger of getting infantile paralysis than one who has not had this operation, Dr. Alfred E. Fischer, of New York University School of Medicine, believes as a result of studies during the 1937 outbreak in and around Toronto.

The child whose tonsils have been removed is not only in greater danger of getting the disease but is more likely to get it in the form which may make him a candidate for an iron-lung existence. This is the bulbar type of infantile paralysis that attacks vital centers of the brain, such as those controlling breathing. The incidence of the bulbar type of the disease was twice as great in patients who had had their tonsils removed at any time during the past, Dr. Fischer found, as compared with those whose tonsils were intact.

"Thus it would appear," he stated, "that not only a recent tonsillectomy but tonsillectomy at any time increases the likelihood of developing this disease."

Science News Letter, November 16, 1940

Muscle-Grafting Operation

USELESS muscles of infantile paralysis victims may be given strength for work by a new muscle-splicing operation reported by Dr. Herbert E. Hipps, of the Crippled Children's Hospital, Marlin, Texas, to the National Foundation for Infantile Paralysis.

Muscles paralyzed by infantile paralysis sometimes fail to work because of bands of diseased tissue within the muscles, Dr. Hipps and associates discovered. To repair such muscles, he cuts out the bands of diseased tissue, or weaves through them strips of tendon from the bulky part of the muscle, sewing these strips into the good muscle bulk below and above the paralyzed muscle.

In six out of 12 cases, good results were obtained with the operation.

More patients might be helped and the operation might be more useful if it were possible to determine the exact condition of the muscle without making a large cut for looking at it. Dr. Hipps suggests that if the muscles of an arm or leg are large and firm, yet graded "poor" or "trace" in respect to function, they will probably show the irregular degenerative changes that might be helped by the operation. If, however, the muscles are soft and small, or if no knots are felt, a general degeneration may be present and the splicing or grafting operation probably would be of no avail.

Science News Letter, November 16, 1940

New Muscle Strength Test

RESULTS with a spring-scale muscle tester and recording device for determining accurately the actual power of paralyzed muscles was reported by Dr. A. A. Schmier of The Hospital for Joint Diseases.

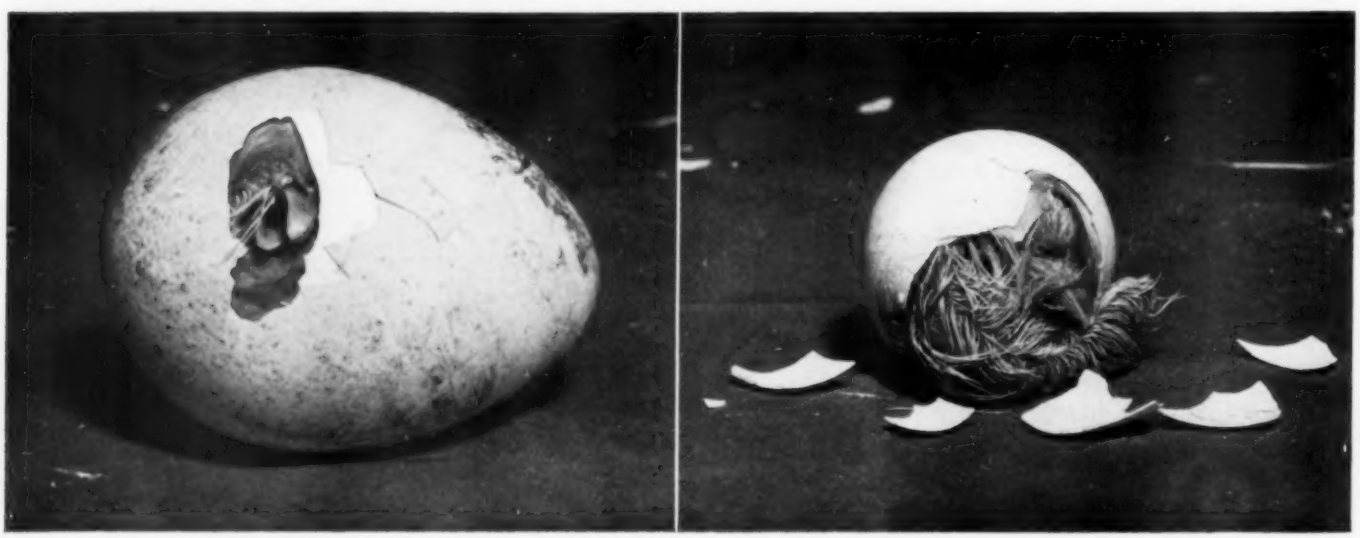
Practically all the muscles of the legs and arms can be accurately evaluated by use of this new device, while the strength of the muscles concerned with the motion of the trunk and pelvis can be measured by a swivel table with a gravity principle scale devised by Dr. Leo Mayer and associates at the same hospital.

Science News Letter, November 16, 1940

Swimming Cuts Resistance

FATIGUE and exhaustion from swimming may pave the way for an attack of infantile paralysis and make it more severe. This notion has long been held by many scientists because in so many cases infantile paralysis patients had been swimming or engaging in some other sport that tired them just before they got sick. The idea is now given considerable scientific confirmation by studies on monkeys reported by Dr. Sidney O. Levinson, of Michael Reese Hospital, Chicago.

As a result, parents may be warned to keep children from swimming, getting



chilled or engaging in tiring sports and contests when there is an infantile paralysis epidemic.

Dr. Levinson infected monkeys with a standard strain of infantile paralysis virus which is known to produce a disease relatively low in mortality and with a fairly fixed degree of paralysis. The monkeys were divided into three groups. One group was left in cages and disturbed only to take temperatures. Another group was immersed in water up to the neck and restrained. The third group was placed in a tank of water at monkey body temperature and forced to swim until fatigued.

In the first group, seven of the 14 animals escaped the disease. None developed paralysis in all four limbs. One developed paralysis of one side of the body with paralysis of one limb on the opposite side. Five developed paralysis of the legs and lower part of the body, and one developed paralysis of but a single limb.

Of the 12 animals kept in water but not allowed to exercise, only two escaped the disease. Six developed paralysis in all four limbs, one developed paralysis of one side and the opposite limb, and three developed paralysis of the legs and lower part of the body.

Of the 15 forced to swim until tired, four escaped the disease, three developed paralysis in all four limbs, one developed a facial paralysis and seven developed paralysis of the legs and lower part of the body.

Not only fatigue from the exercise but the water immersion itself proved a harmful influence, Dr. Levinson said. This is possibly due to chilling and must and will be studied, he says, during the coming season.

Science News Letter, November 16, 1940

MEDICINE

Cancer-Causing Stuff Found In Non-Cancerous Livers

Persons Suffering from Cancer in Other Parts of Body Accumulate Substance in Liver; Understanding Aided

A CANCER-CAUSING substance (or substances) accumulates in the livers of patients suffering from cancers in other parts of their bodies. Suitably extracted and prepared, it is capable of producing new cancers when injected into mice.

Such is the announcement, possibly heralding an important new advance in the scientific understanding of cancer (and hence its ultimate control) by Dr. Paul E. Steiner of the University of Chicago. (*Science*, Nov. 8.)

The chemical nature of the substance is still unknown, but Dr. Steiner states that he is at work on this, as well as on the questions of its origin and its distribution within the body.

In one of his experiments, the Chicago researcher started with approximately two pounds of liver tissue, obtained from persons who had died of cancer in five different organs, but none of them involving the liver. After repeated extractions with a strong alkali, there was left a flaky, brown, ill-smelling residue. Dissolved in sesame oil and injected in small quantities into the bodies of mice, this produced typical cancerous tumors in a convincing number of cases.

Elaborate control experiments were performed, to eliminate the chance that the new cancers might be arising from some other cause, but in every case the indications pointed back to the brown liver extract as the most probable cause. Further intensive research is now in progress.

Science News Letter, November 16, 1940

CHEMISTRY

Invention Tells Instant Chemical Action Occurs

THE so-called "magic eye" used in radio sets for tuning has a new use in the field of analytical chemistry. It shows the instant that all the chemical changes are completed in the process called "titration" and will be useful in analyzing the manganese content of steel, of the chromium in chrome-tanned leather.

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FOR SOMEONE'S FEAST

The series of photographs on this and the facing page shows the hatching of a baby turkey on the farm of Clifton Timmerman in Jefferson County, N. Y. The first view was taken 28 days after the egg was put into the incubator, just as the little bird pecked through the shell. The next view is 12 hours later. He gets his head out after another ten hours. Finally, another 24 hours later, he is all fluffed up and ready to scratch.

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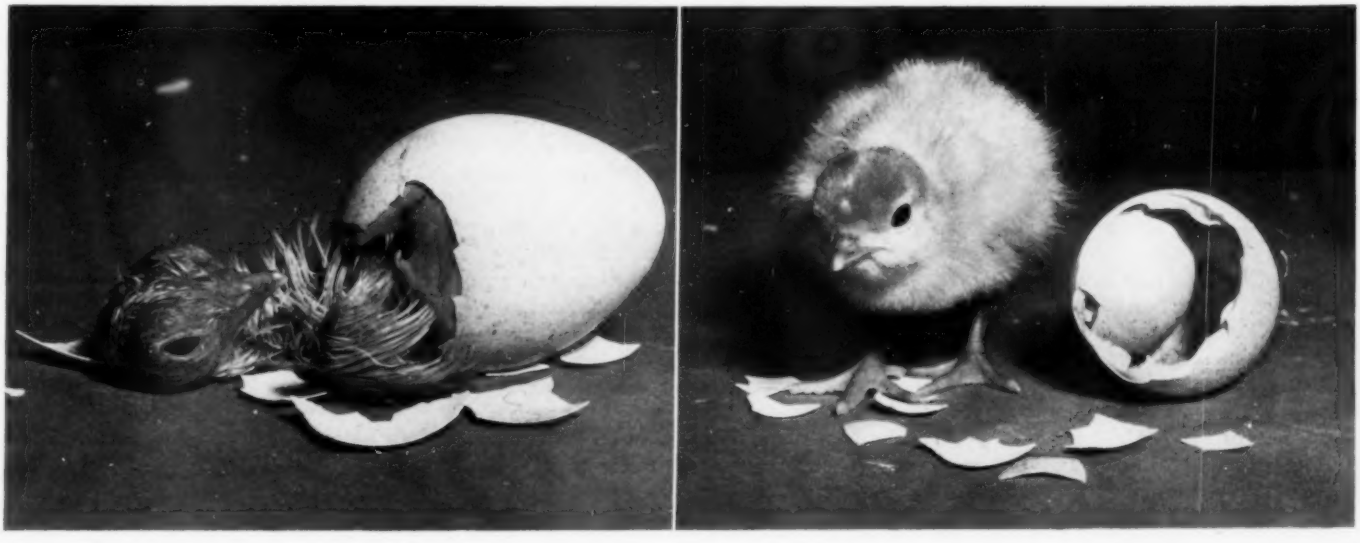

PHYSICS

New Series of Elements That Change Like Radium

DISCOVERY of a fourth series of chemical elements which change one into another, like the famous radium series, is suggested in a communication just received in the United States from Finland by Dr. Alfred C. Lane, emeritus professor of geology at Tufts College.

The best known series of these radioactive elements is the one that starts with uranium and ends with lead, radium occurring as the sixth step. Another series starts with thorium, and the third involves an element called actinium. Many physicists have suspected the existence of a fourth series, but until now there has not been evidence.

Dr. Walter Wahl, of the University of Helsingfors, has informed Dr. Lane of his new experiments. These were made with the mass-spectrograph, an instrument which sorts out atoms according to their weights. This same instrument was used in obtaining minute quantities of uranium 235, element believed to be capable of producing practical atomic power.

In analyzing, with the mass spectrograph, certain minerals that are geologically very old, he found evidence of a form of some unknown element of weight 237. This had never been obtained before. As all other elements weighing as much as this are radioactive, Dr. Wahl concluded that this must be also. However, he showed that it cannot belong to any of the three series now known, and he therefore suggests that it is a member of a fourth series.

Evidently he wishes further confirmation of the discovery, for he says that further investigations are being made. He explains that "uncertain conditions, during the European war, which now as earlier at any moment may lead to conditions in which research work is interrupted, makes it necessary to communicate already at this stage the observations made."

By determinations of the amount of lead from the decay of radium in ancient rocks, geologists have been able to measure their age. Possibly, if the new radioactive series does exist, and if lead is one of its products, it may account for slight discrepancies that have been observed in such measurement, Dr. Lane suggests.

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PALEONTOLOGY

Wormholes From Dinosaur Days Found in Northern China

FOSSIL wormholes, chewed into the petrified wood that was part of living forest growth far back in the days of the dinosaurs, have been found in a petrified forest in the wild parts of northern China by an American missionary-scientist, Rev. G. B. Mathews, with headquarters at the Catholic University of Peking.

Father Mathews discovered the petrified forest in the course of his mission travels. Once hundreds of square miles in extent, there are today only scattered and isolated fragments. The rest has been eroded away in the course of many tens of centuries.

The petrified tree stumps still stand on their own roots, which itself is a rarity in fossil forests. Breaking off specimens disclosed the wormholes, as much as three inches beneath the bark. They are from a sixteenth to a quarter of an inch in diameter, and some of them contain pellets of "frass" or food waste, from the meals of the unknown larvae that chewed the wood.

No trace of the hole-borers themselves has been found, but Father Mathews is hopeful that the frass pellets can give some idea of their makers, if examined by entomologists with sufficient experience in the study of wood-boring larvae. There is, of course, the possibility that larvae or pupae of the ancient hole-makers themselves may yet be found.

Geologically, the fossil wormholes belong to the Upper Jurassic period, of an age estimated in excess of 150,000,000 years. Fossil wormholes have previously been reported in petrified wood from Egypt and South Dakota but in both these instances the material had been poorly preserved, so that close study was not possible.

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CHEMISTRY

Post-Graduate Fellowships To Be Awarded in Chemistry

SIX post-graduate fellowships in chemistry, carrying stipends totaling $13,000, will be awarded soon by the Lalor Foundation, it is announced by Dr. C. Lalor Burdick, secretary of the Foundation. Four of the fellowships carry $2,000 each; the other two $2,500 apiece. They are open to both men and women who have completed the work leading to a Ph.D. or its equivalent. Six eminent chemists, at leading American research institutions, will examine applications and make the awards.

Dr. Burdick stated that qualified persons interested in the fellowships may obtain detailed information and application blanks by addressing him at Wilmington, Del. Appointments will be announced early in 1941.

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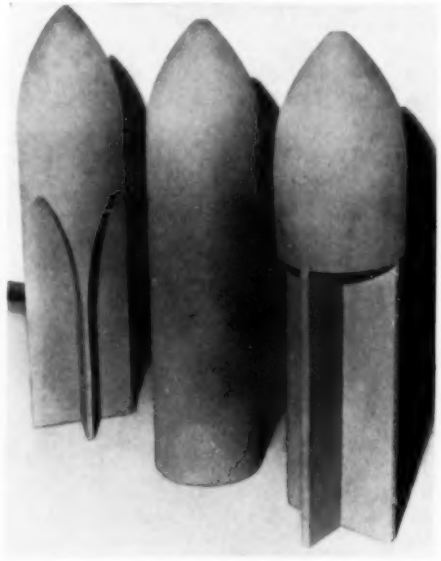

MODERN

These three streamlined aerial projectiles were designed by Leonardo. The center one is practically a duplicate of recent-type artillery shells; the streamlined model on the left is closely similar to bombs dropped from airplanes and fired from high-angle trench mortars. It is known that Leonardo experimented with models of flying machines, also that mortars were favorite weapons in his plans for siege operations.

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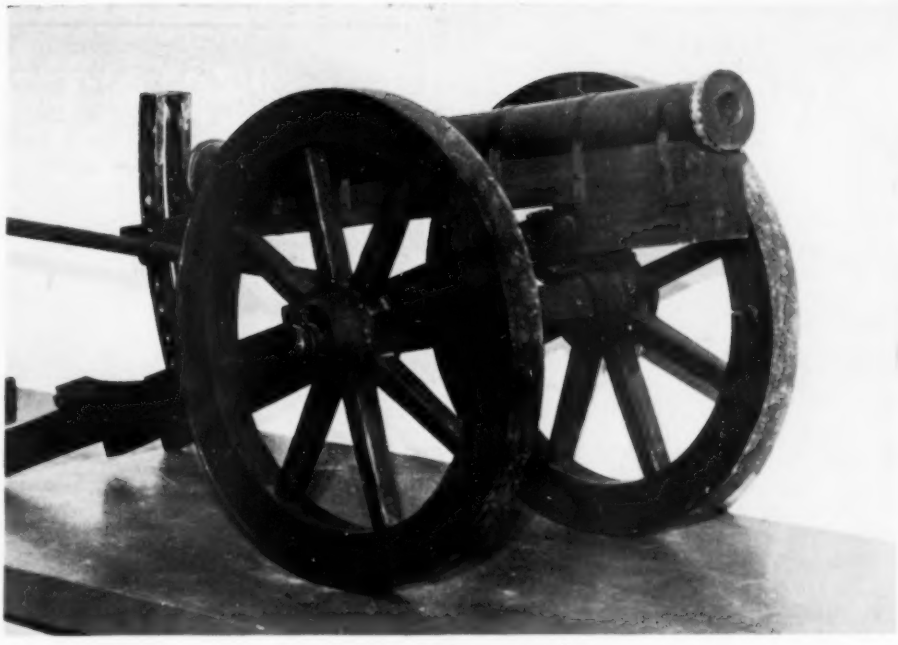

IDEA STILL USED

Leonardo da Vinci, famous as painter and sculptor, was a great inventor and military engineer as well. One of his inventions, that revolutionized field artillery in his day, was the device for rapidly changing the elevation of a cannon, and for shifting its horizontal aim also. In modern blitzkrieg weapons, the same fundamental idea is used. This model and those pictured on the facing page are part of a special exhibition of the scientific work of the great Florentine genius now being shown in New York at the Museum of Science and Industry.

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CHEMISTRY—INVENTION

German Invention for Gasoline From Water-Gas Revealed

New Method Just Patented in United States Claims To Increase Production of Fuel 60% Over Older Methods

REVELATION of a means by which gasoline is possibly being obtained in Germany for the airplanes that make the nightly raids on England is contained in a patent just issued by the U. S. Patent Office. Its number is 2,220,357, and it was issued to Michael Steinschläger, of Moers, Niederrhein, Germany, who has assigned his American rights to the Koppers Company, Pittsburgh.

Water-gas used for fuel and illuminating purposes, is obtained by passing steam over glowing coal. Chemical processes have been used in the past, by which such gases have been chemically changed into liquid hydrocarbons, of which gasoline is an example.

Herr Steinschläger claims that his method increases production of the liquid materials from a given amount of the original gas by 60%, but the fuel consumption is increased only 10-15%. He accomplishes this by storing some of the ordinarily wasted heat, and retreating some of the waste gases that have gone through the first stage of the process.

Patent on Invisible Glass

Two patents, Nos. 2,220,861 and 2,220,862 were granted to Dr. Katharine B. Blodgett, physicist of the General Electric Company, for the "invisible glass" which she invented, and which has attracted a great deal of scientific attention in the past year or two. Both patents were assigned to her employers.

The first is for the method of treating a glass surface with a film, its thickness equal to one-quarter of the wave-length of the light falling on it. With such a thin film, the surface reflects practically no light, but it all passes through. Many applications are possible in optical instruments, such as photographic lenses, periscopes, range-finders, etc., to increase their efficiency by eliminating wasteful reflections of light between the various lenses.

Films prepared in this way are easily rubbed off. The second patent provides a means of making this permanent. Thin layers of glass containing metals, thus increasing their power to bend light rays, are fastened to both sides of a sheet of another kind of glass. By chemical treatment of the outer layers of the sandwich, a durable film, with the proper reflection-reducing properties, is formed on their surfaces.

Readymade Bathroom

When you build a house, it may soon be possible for you to order from the wholesaler a complete bathroom, stamped out of metal, like an automobile, and all ready to place and connect to the plumbing. Patent 2,220,482, granted to Richard Buckminster Fuller, New York architect, provides a method of making such prefabricated units. They are to be built in several sections, each of which can be carried through ordinary doors to aid in their installation when a house is already built. This patent is assigned to Phelps Dodge Corporation of New York.

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ASTRONOMY

Home-Made Projector Shows Positions of Stars

A HOME-MADE projector used in the Berkshire Museum, costing only $250, shows visitors the arrangement of the stars and planets at different times and places, thus serving some of the purposes of the elaborate and expensive projection planetarium used in five American cities.

Unlike the big instrument, this "stellarium," as it is called, makes no effort to reproduce the actual appearance of the heavens, for the pictures are projected on a flat ceiling, instead of a dome.

The stellarium was built by three young electrical engineers, Willard F. M. Gray, Stephen C. Leonard and Guiles W. Bradshaw. A drum, two and a half feet in diameter, contains all the mechanism.

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ASTRONOMY

Cunningham's Comet Nears And Becomes Brighter

See Front Cover

CUNNINGHAM'S COMET, as photographed from the Harvard College Observatory while it was approaching the earth, is shown on the cover illustration. Above the bright coma can faintly be seen the tail. In coming weeks this will lengthen, and the entire thing will brighten, so that it will be easily visible to the naked eye around Christmas.

Because this is the first bright comet since Halley's made its last visit in 1910, Cunningham's comet is attracting a considerable amount of attention.

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CHEMISTRY

Trace of Scotch Liquor Gives Whisky Smoky Taste

PEAT smoke flavor of whisky is not proof that it contains a great deal of Scotch. Samples of domestic blended whiskies containing as little as 5% of Scotch malt whisky, the rest being neutral spirits, have been found to have a light peat smoke flavor, Peter Valaer, of the U. S. Bureau of Internal Revenue, reports. (*Industrial and Engineering Chemistry,* July)

Such a whisky cannot, under the Federal Alcohol Administration's rules, be called a "blended Scotch type whisky," Mr. Valaer explains. Generally, 20% to 30% of the Scotch malt whisky is used, blended with neutral grain spirits, and supplemented with caramel coloring and other blending materials in small amounts, among them sugar, sherry, brandy, honey and fruit extracts.

As made in Scotland, the malt whisky, which is prepared from barley, makes up 30% to 50% of the blend, and it is mixed with grain whisky, made from Indian corn imported from Argentina, the United States and elsewhere. This, Mr. Valaer finds, accounts for the difference in the analysis, taste and aroma of the imported product. The best way to ascertain the amount of malt is by measuring the fusel oil in the mixture.

It is the malt whisky that contains the substances giving the peat smoke flavor. In analyses, these can be isolated from the rest of the whisky, and make up about 1/2,000 of the total volume.

Mr. Valaer finds that the Scotch climate has an effect, and the whisky actually gets weaker while it is being aged. "During the aging under conditions of the unheated humid warehouses of Scotland, the proof goes down," he says. "In the higher, warmer and drier storage conditions of the United States, the proof goes up during storage and aging. As a general class, blended Scotch whisky is imported at about 86° proof, which is lower than many American whiskies as sold to the consumer."

Science News Letter, November 16, 1940

ASTRONOMY

One Area Of Sun Is Most Active In Producing Spots

EVEN though the sun is a globe of gas without any solid anchorage, one particular area of its surface has been a favorite place for sunspots for at least 75 years. This conclusion is supported by studies made in the last few years, while the sun was passing through a time of great spottedness, by Dr. Fernando Sanford, professor emeritus of physics at Stanford University. (*Science,* Oct. 4)

The time taken by the sun to turn is about 25 days at the equator, and slower nearer the poles. For the belt in the northern hemisphere where many spots appear, Dr. Sanford has taken the time as 27¼ days.

During 180 solar rotations, over periods including the years 1917-1922, 1925-1931 and 1938-1940, the largest spots occurred most often on the fourteenth day of the rotation cycle. On the average, these spots were two thirds again as large as those occurring on the twenty-fourth day, which was the minimum.

Dr. Sanford has extended this back still farther to include two of the largest spots ever recorded. One of these, with an area of 972 million square miles, crossed the center of the sun on Oct. 13, 1865, the other on Oct. 31, 1903. The time between these dates is 13,897 days.

"Allowing 27.25 days to one solar rotation would give exactly 510 solar rotations between the passage of these two great spots," he states.

From the 1865 spot to a large one which crossed the sun July 14, 1940, there were 27,109 days. "Assuming that there were 995 solar rotations in this period," he continues, "a single rotation would require 27.245 days, lacking only seven minutes of 27.25 days." This would be very close agreement.

"Evidently the active region on the sun's surface has persisted for more than 75 years," says Dr. Sanford.

Science News Letter, November 16, 1940

IN SCIENCE

BOTANY

Holly Leaves Prevented From Falling off Greens

HOLLY, which will soon be moving to market from the Pacific Northwest, its chief cultivation area in this country, often suffers considerable loss in sales value through dropping off of its leaves. A method for preventing this, through treatment with a growth-promoting acid, has been worked out by Dr. J. A. Milbrath and Prof. Henry Hartman of Oregon State College. (*Science,* Nov. 1.)

The holly branches and wreaths are sprayed with, or dipped into a solution of alpha naphthalene acetic acid, one of the growth-promoting substances that has also been found useful in preventing apples from dropping off the trees before they are ripe. Branches treated with a .01% solution of this substance did not lose their leaves in two weeks, even when subsequently exposed to ethylene gas, which completely defoliated untreated branches in two days.

Science News Letter, November 16, 1940

PUBLIC HEALTH

Bovine Tuberculosis Now Practically Wiped Out

BOVINE tuberculosis is now practically eradicated throughout the United States, the U. S. Department of Agriculture announced. The last two counties, Kings and Merced, in the last State, California, have completed their testing and retesting for infected cattle, and now every county in every state in the Union has fewer than one-half of one per cent of its cattle infected.

The campaign has been going on for 23 years, in the course of which more than 232 milion tuberculin tests and retests have been made, and about four million tuberculous cattle detected and removed for slaughter.

This does not mean, it is pointed out, that nothing further remains to be done. Retesting is still called for, especially in herds from which tuberculous animals have been removed in recent years, to prevent reinfection and a new spread of the disease.

Science News Letter, November 16, 1940

NE FIELDS

PHYSICS—FORESTRY

Wind Tunnel Aids Study Of Forest Fire Conditions

A WIND tunnel, like those used by aviation engineers, has been built at the California Forest and Range Experiment Station for the study of forest fire conditions. It is described in detail in *Journal of Forestry,* (November) by Wallace L. Fons, of the Station staff.

No effort is made to attain the wind velocities commonly attained in the wind tunnels used in aviation research, for these hurricane air speeds have little significance in connection with forest fires. Velocities below 15 miles an hour have been found sufficient for all practical purposes.

A number of other research problems in forestry, outside the field of fire investigation, have been suggested for further use of the tunnel. These include effect of ground cover on wind erosion, evaporation of moisture from soil surfaces, efficiency of various types of windbreaks, distribution of tree seeds, and migration of insect pests.

Science News Letter, November 16, 1940

ASTRONOMY

Prominent Star in North Increasing in Brightness

AFTER nearly a year in which its brightness remained practically constant, the star gamma, in the prominent northern constellation of Cassiopeia, the queen, has again brightened. Dr. Harlow Shapley, director of the Harvard College Observatory, has been advised by Dr. Ralph B. Baldwin and Robert Tarp-Smith, of the Dearborn Observatory of Northwestern University, on Oct. 29, that the star had brightened about 20% from what it was a week earlier.

This observation followed remarkable changes in the spectrum of the star, observed by Dr. Otto Struve and Dr. P. Swings, of the Yerkes Observatory. The spectrum has shown the presence of a gaseous shell, but this is now fading. A similar effect was observed in 1936. Then, as now, the star brightened as the spectrum faded.

According to Leon Campbell, of the Harvard Observatory, observations made by amateurs, members of the American Association of Variable Star Observers, from Dec. 1, 1939, to Sept. 15, 1940, showed its brightness constant around magnitude 2.9 and 3.0. When Dr. Baldwin and Mr. Tarp-Smith measured it, the magnitude was 2.6, about 40% brighter than this.

Cassiopeia is the group now visible in the northwestern sky, shaped like a letter M. Gamma is the star at the bottom of the center part of the M.

Science News Letter, November 16, 1940

INVENTION

Nails Can Be Driven In Sawdust Concrete

CONCRETE made with sawdust is now proving useful in many agricultural applications. It is 14 times better than ordinary concrete as insulation against heat or cold, it floats on water, nails can be driven into it, yet it will not burn, and termites cannot eat it. However, it is not adapted to uses where exposed to wear or water. (*For information: American Society of Agricultural Engineers,* St. Joseph, Mo.)

Science News Letter, November 16, 1940

MEDICINE—PSYCHOLOGY

Test of Steering Better Than Blood Alcohol Test

A SIMPLE steering test of a man or woman who has been drinking is better than a blood alcohol test for diagnosing drunkenness in automobile drivers, Dr. Henry Newman and Edwin Fletcher, of Stanford University School of Medicine and the Division of Drivers' Licenses, State of California, found in tests of eight women and 57 men. (*Journal, American Medical Association,* Nov. 9).

Both blood tests and performance tests should be used in the diagnosis of drunkenness in drivers, they believe. They suggest that any person before being allowed to drive a motor vehicle should be required to pass tests for minimum standards of skill. A driver suspected of being drunk could then be retested and if his performance fell below the accepted standard, and the presence of alcohol in his blood was proved, he should be convicted of drunken driving, regardless of the concentration of alcohol in his blood.

Science News Letter, November 16, 1940

MILITARY SCIENCE

Need for Super-Heavy Tanks Less Here Than in Europe

SUPER-HEAVY tanks, such as the Germans used in breaking through the "Little Maginot Line" and crushing Allied resistance early last summer, are not as great a need in the American Army as they are for European nations.

Such is the opinion of Capt. C. R. Kutz, U. S. A., as expressed in *Army Ordnance.* (November-December.)

There are no great fortified lines on this continent, and the nature of our terrain makes their construction unlikely, Capt. Kutz points out. Nevertheless, in a mechanized war, a spearhead of big, heavily armed tanks can do a great deal toward establishing dominance in the field leaving mopping-up and holding jobs for lighter fighting vehicles and for motorized infantry and artillery.

The world-old race between armor and armament is on in deadly earnest, in the ranks of the super-heavies. Most of the 70-to-80-ton tanks used by various powers in earlier phases of the present war carry armor thick enough to stop any shell lighter than 75 millimeters, and some of the armor will even stop some shots of this caliber.

On the other hand, there is a steady tendency for the guns to become heavier and more numerous. The first tanks used in World War I carried only machine guns, but before the end of that struggle tanks were carrying as many as four 75-millimeter guns, and there were some huge ones carrying one 155-millimeter (6-inch) gun apiece, besides lighter pieces. The same tendency holds today.

Capt. Kutz feels that for assurance of success against other super-heavies, modern break-through tanks should carry guns of 75 millimeters caliber, while for attack on strongly fortified positions the 155-millimeter caliber is necessary. An intermediate caliber of 105 millimeters (4-inch) is also available.

All of this runs up tonnage at a terrific rate. Giant tanks are too much for present-day highways, and especially for highway bridges, to carry. It is therefore necessary for them to move up to the battlefield by rail, either on ordinary freight cars or on special, low-slung rolling stock. This in turn limits their height and width to the clearance provided by tunnels, and their weight to what the weakest bridge or trestle on the line will carry.

Science News Letter, November 16, 1940

NUTRITION

New Flavors for Feasts

New Unit for the Household Makes It Possible to Have Frozen Fresh Vegetables, Meats, Fruits for Holidays

By DR. FRANK THONE

THANKSGIVING and Christmas, the two great feasts in the American calendar, are close upon us. From our earliest days, both have called for well-laden dinner tables, and for variety as well as abundance, too. In the pioneer epoch, the proud housewife brought out her choicest preserves and pickles, to wedge in among the platters of meat and bowls of fresh vegetables.

Later, canned goods of all kinds increased the number of dishes.

Science's latest contribution to America's festal board (and to everyday meals as well) has been the frozen pack method, which permits the appearance of practically any meat, vegetable or fruit on the table at any season without loss of the full flavor and aroma of freshness. If you happen to fancy strawberry shortcake for dessert on Thanksgiving, instead of the day's traditional pumpkin pie, you can have your strawberries, fresh as the morning they were picked.

At present, the prevailing method of handling frozen foods is to sell them out of glass-walled refrigerator cases. The customer either prepares them immediately or stores them for a short time in the coldest part of her electric refrigerator.

Soon on Market

However, new household storage units have been developed, and will soon be on the market. These can contain as much as a barrel of assorted ready-packaged frozen foods, and are adjusted to the low temperatures necessary for long-time keeping. The purchaser can therefore lay in a very considerable quantity of provisions drawing on the cache as occasion requires.

This device is essentially a reduction to house or apartment scale of a considerably larger unit that has already proved a substantial success in country districts, the food locker. Food lockers are usually installed by rural refrigerating plants, to enable cooperating patrons to kill, freeze and store their own meat, and draw upon it when they want it. Whole beeves and pork carcasses are now being stored this way by thousands of farmers who used to have to sell their animals and then buy small quantities of meat over the counter, unless they wanted to live entirely on salt or smoked meat.

Frozen-pack foods already have an established and growing share of the American market, but their promoters (all of them enthusiasts) are not satisfied. They are constantly seeking new foods to freeze, and new ways to improve the ones already being commercially frozen. Research first made frozen foods possible, and research is being applied on a hundred fronts to increase their number and quality. Government and industrial laboratories vie with each other in making new advances.

Useful for War

Improvements which they are making today and will make in near tomorrows will have more than a festal significance, for provisioning the hosts of new soldiers and sailors now being added to the nation's defense forces will tax this new food-handling technique as well as older ones. And, incidentally, the frozen-pack method has already proved a major contribution to America's welfare, for it made possible the preservation and subsequent use of vast quantities of surplus foods that would otherwise have been unsalable during the worst days of the depression.

The frozen-pack method consists essentially in exposing foods to temperatures of an Arctic blizzard, so that a sudden stop is put not only to the action of germs of decay but also to that of their own internal digestive juices or enzymes. Cold checks them in physiologically fresh condition, and as long as they are held at a sufficiently low temperature they remain in that state of timeless youth—like Sleeping Beauty in the fairy tale.

The method was first applied to fish. Tradition has it that Clarence Birdseye, now a leader in the industry, was fishing through a hole in the ice during a bitter winter in Labrador. He noticed how the fish froze as soon as they were tossed out on the surface, and also that no matter how long they were kept that way they stayed unspoiled, and were as good as fresh when thawed out. (Some, it is said, even came to life again!)

Commercially applied, quick freezing proved highly successful with many kinds of fresh fish, with lobster and crab meat, even with oysters. It was successful, too, with meat—but with a difference. The sooner fish and other sea-foods are frozen after catching, the better, but meat must be kept for a certain period before freezing. This is because the self-digestive processes that always go on in tissues produce off flavors in sea-foods, whereas a certain amount of this gives the flesh of warm-blooded animals a better taste. The exact point at which meat and poultry should be frozen is one of the most interesting research subjects in the industry.

Government Pioneered

Vegetables and fruits entered the picture a little later. A great deal of research on these was pioneered at the Frozen Pack Laboratory maintained by the U. S. Department of Agriculture in Seattle, under the direction of H. C. Diehl, a well-trained plant physiologist. Now there are scores of frozen fruits and vegetables available, ranging from peas and beans to mushrooms, from red raspberries to the makings of cherry pies.

ALL IN THE HOUSE

The young housewife selects vegetables for dinner, out of the ample store in the well-refrigerated household cache of frozen foods.

FROZEN CANNED BERRIES

When opened in a U. S. Department of Agriculture laboratory they come out as fresh and flavorful as they were when the cans were sealed, months ago.

You don't just freeze any old thing, for the frosted-vegetable market. Some varieties give much better results than others, due to peculiarities of internal biochemistry. That is where plant physiology comes in. Also, probably, genetics; for it now appears likely that the best way to get first-class frozen vegetables and fruits is to breed them especially for the purpose.

Retail marketing of frozen foods is to a considerable extent a matter of attractive packaging, as is marketing of all kinds. Commonest, perhaps, is the simple rectangular carton, now frequently provided with a transparent window, so that the customer can see what she is getting. However, many other types of container are in use, including glass jars and tin cans. These latter, being liquid-tight, have particular advantages when fruits are being offered in their own juices or in syrups.

Fresh fruit juices are also being marketed in the frozen state. This offers considerable advantages over the older methods of handling in glass or tin, in many instances, for certain kinds of fruit juices lose flavor or vitamin content when heat-treated, as is necessary in bottling or canning. Moreover, you do not need to put ice cubes into your juice if you want to serve it cold: just dump a sufficient quantity of orange or grapefruit juice cubes into a pitcher, and when they have partly melted go ahead and fill up the glasses.

Science News Letter, November 16, 1940

MEDICINE

Cancer Fight Advanced by Success of Slow Neutrons

CURE of a certain type of cancer in mice by slow neutrons is announced by Dr. Paul A. Zahl, Dr. Franklin S. Cooper and Dr. John R. Dunning, of Memorial Hospital, the Haskins Laboratories, and Columbia University, in a report to the National Academy of Sciences. (*Proceedings*, Oct.)

This appears to be an important step toward the better treatment of human cancer which physicists and physicians have hoped would come from the atom-smashing cyclotron in which the neutrons are produced.

Fast neutrons, like X-rays, can destroy cancer but their usefulness in treatment is limited by the fact that they also destroy other living tissue. Slow neutrons, of the kind used in the spectacular splitting of the uranium atom, should be able to pass through the body with little or no damage to the tissues. When slow-neutron-capturing chemicals, such as boron or lithium, are injected in or around a cancer, the action of the neutrons on the capturing chemical should result in destruction of the cancer, while surrounding body tissues are unharmed.

Test-tube experiments with cancer tissue removed from the body showed that the boron-slow-neutron attack on cancer was five times as effective as a fast-neutron attack on cancer. This was reported by Dr. P. G. Kruger, of the University of Illinois.

The mouse experiments now reported by the New York investigators show the effectiveness of the slow-neutron-boron attack on cancer in living animals.

For any possible future use of this attack in treatment of cancer, the New York investigators believe that a better device than hypodermic injection should be developed for localizing either boron or lithium in the cancer tissue. Attaching lithium to large-particle colloidal dyes and injecting this into the veins is a promising improvement in the technic now being investigated.

Science News Letter, November 16, 1940

ENGINEERING

Diesel-Powered Buses Prove Good To Cross Continent

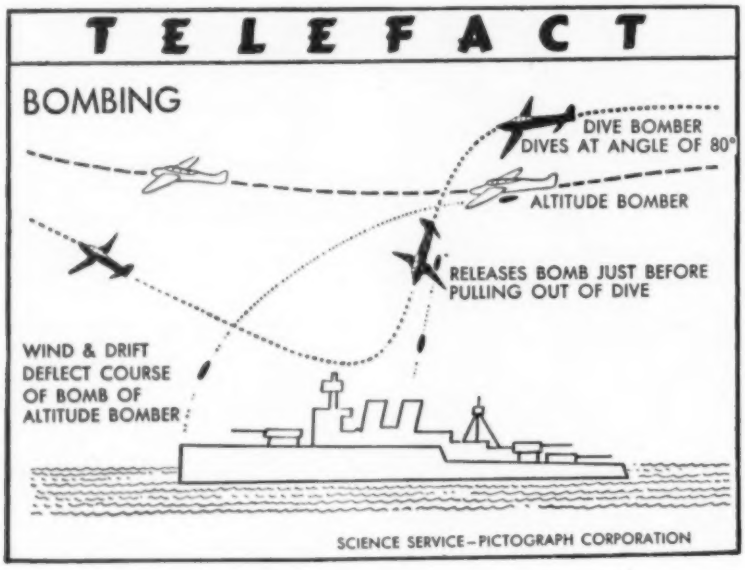
BUSES operated by Diesel engines have proved satisfactory in more than a year's service between Chicago and California, W. A. Taussig, of the Burlington Transportation Co., told the National Fuels and Lubricants Meeting of the Society of Automotive Engineers in Tulsa.

In the first few months of operation, during the summer of 1939, he said, a great deal of trouble was experienced with engine failure. However, these difficulties were overcome and changes were made in the engines to improve their service. As a result, 17 more buses were added to the original fleet of 21.

"A fuel saving of approximately 30% has been realized by the introduction of Diesels," Mr. Taussig stated. "While there have been some exceedingly discouraging experiences in the past, it now appears that the hardest part of pioneering is over, and unquestionably, in the future, more and more operators will avail themselves of the possibilities of fuel economies through Diesel operation."

Science News Letter, November 16, 1940

At the National Bureau of Standards, the most accurate of *thermometers* show an error of at least a twentieth of a degree.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ASTRONOMY

Near Solution of Mystery Of Sun, Nebulae Elements

Nebulium Seems To Be Merely Ordinary Oxygen Disguised And Coronium May Also Be Oxygen But This Is Not Sure

AFTER years of study, astronomers seem now close to solving the problem of the identity of nebulium and coronium, "mystery elements" found in the distant nebulae and in the sun's corona, which is visible best at eclipse time.

According to a paper by a British astronomer, Clifford G. James, in the annual report of the Smithsonian Institution, just issued, the former seems to be merely ordinary oxygen in disguise. The latter may be oxygen also, though this is not yet certain.

Each of the 92 known chemical elements, when its vapor is made to glow, gives off a characteristic kind of light. This can be identified by the lines which appear when this light is analyzed through the prisms of a spectroscope. Thus it is possible to tell the elements that exist in the distant stars and the sun.

In 1868, Sir Norman Lockyer found a line in the light of the sun which could not be identified with any earthly element, so he called it helium. Later it was found on earth, as a light gas.

Four years before Lockyer's discovery, another English astronomer, Sir William Huggins, had found a strange green line in light from the distant nebulae in the sky. This was ascribed to a hypothetical element called "nebulium." Similarly when in 1869 Charles A. Young, then of Dartmouth College, found a mysterious line, also green, in the sun's corona, this was credited to another element, "coronium."

"In many cases," says Mr. James, "speculation overrode sound scientific method and it was suggested by good authorities that this celestial radiance might be due to primeval world stuff, the cosmic protoplasmic fluid from which the world had been manufactured in the beginning. As new elements were discovered their spectra lines were matched with those of nebulium, but to no purpose. None were found to coincide. It gradually came to be accepted that the hypothetical nebulium was some familiar gas clothed in an unfamiliar fashion."

Explanation of nebulium came when Dr. I. S. Bowen, of the California Institute of Technology, showed that it is probably merely oxygen atoms excited to an abnormal state. The enormous energy required for this excitation seems to come from very hot stars, at temperatures up to 200,000 degrees Fahrenheit, associated with the nebulae. Under these conditions shifts of electrons in the oxygen atoms, which are "forbidden" on earth, can occur and these shifts give out the strange kind of light.

There is still some uncertainty about coronium, says Mr. James, but, "it is possible that it may be diffuse oxygen in an unfamiliar ionized state."

Science News Letter, November 16, 1940

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MILITARY SCIENCE

Shot May Supplant Shell As Anti-Tank Missiles

SOLID shot may supplant explosive shell as missiles for anti-tank cannon, Brig. Gen. R. H. Somers, of the Ordnance Department, U. S. A., told the Army Ordnance Association meeting in New York. Experimental firings have indicated that if the tough armor of a tank can be penetrated there is no real need for an explosion inside.

Anything that breaks through is practically certain to hit something vital within, because engine, transmission, fuel supply, ammunition, guns and crew are packed so closely together that a miss is virtually impossible. Solid shot has the advantage of being better able to smash through the increasingly thick armor of a tank; besides, it is considerably cheaper and can be made in less time.

While the Army's new 37-millimeter anti-tank gun was designed specifically for the job of combating tanks, any gun within shooting distance will be turned on the clanking monsters when they appear on the battlefield, Gen. Somers continued. The Army's modernized 75, with its split trail permitting wide and rapid traverse, is well adapted for anti-tank work, especially against "super-heavies" of the type that enabled the Germans to break the French front so quickly last summer.

Gen. Somers also spoke on new types of anti-aircraft cannon, especially the new

90-millimeter rifle, which can reach considerably higher than the three-inch piece in current use, and throw a shell weighing twice as much at nearly the same rate in shots per minute.

At the same program, Col. H. H. Zornig of the Aberdeen Proving Ground described steps that have been taken to produce artillery ammunition more rapidly yet with less waste of material and hence at lower cost. Col. J. K. Christmas, also of the Aberdeen Proving Ground, told of advances in speed, armament and armor that have been achieved with tanks.

Science News Letter, November 16, 1940

AERONAUTICS

Captured German Planes Give No Sign of Rubber Shortage

GERMAN airplanes brought down in Britain thus far give little indication of the shortages in natural rubber and high-octane fuel hopefully talked of for months, editorial comment states in *The Aeroplane,* British aviation journal. (Oct. 11.)

Tires, the editorial article declares, are excellent, and liberal use of rubber has been made elsewhere in the planes, especially around the many-coated fuel tanks, to prevent loss after bullet or shell-fragment puncture. There is far more rubber in each of the German planes than in any British machine, says the writer, who sharply criticizes the Minister of Economic Warfare for having given out assurances to the contrary.

"Similarly," the article continues, "the fuel and oil position, as shown by the evidence of these German machines, cannot be as bad in enemy territories as we had believed. Although all the fuel tanks are marked with the sign of 87-octane fuel they were invariably found to contain 92-octane petrol on analysis. The oil in the German aero-motors showed signs of being used longer than is normal practice here, but not to the extent of harming the motors."

The article praises the quality of workmanship shown in German planes, but finds considerable fault with their basic design, especially in the case of the bombers. German bombers apparently had too easy a time in the "laboratory" of the Spanish Civil War, and carried their faults with them into the present conflict. Efforts to correct some of these (for instance, shortage of defensive armament) have resulted in patchwork improvisations "stuck on", rather than far-reaching improvements built into, the fundamental design, the writer claims.

Germany's Messerschmidt fighter planes, however, fare somewhat better at the hands of this editorial critic. While he has a low opinion of the Me 109, with which the Nazis entered the present war, he gives considerably better rating to the Me 110.

Some discount may have to be applied to the opinions editorially expressed in *The Aeroplane,* for this journal has consistently followed the policy of "knocking" practically all non-British airplane designs, especially the American. In another part of the same issue, the editor finds fault with the Lockheed, which, renamed the Hudson, has been doing remarkably well in the present Battle of Britain, and expresses a doubtful opinion of the Aircobra type as "unorthodox."

Science News Letter, November 16, 1940

●RADIO

Dr. Edward Kasner and James Newman, mathematicians, will speak on "Mathematics of Pretzels, Googols and the Game of Craps" as guest scientists on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Nov. 21, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST.

Listen in on your local station. Listen in each Thursday.

INVENTION

Sealing Machine Now Opens Letters, Too

LETTERS can be both opened and sealed with a new combination machine. It handles commercial-sized envelopes at speeds up to 250 per minute. (*Multipost Co., Rochester.*)

Science News Letter, November 16, 1940

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PUBLIC HEALTH

NATURE RAMBLINGS

by Frank Thone

Dangerous Animals

THE MOST dangerous four-footed beasts now living on this continent are not bears or wolves, not moose or bison. For all their size and strength and formidable armament, these claim very few human victims. Man is much more dangerous to them than they are to him.

The really dangerous mammals in North America are the members of the rodent family—rabbits and squirrels and rats. They are menaces to mankind because they are known to be agents in the distribution of at least three dangerous and sometimes fatal diseases: tularemia, typhus fever and bubonic plague.

Rabbits are so characteristically carriers of tularemia that the disease is sometimes called rabbit fever. Tularemia got its name from the fact that it was first discovered in the region of the tule (cattail) swamps of the Pacific coast, but it is now known to be country-wide in its spread. Standard instructions to hunters and all other handlers of wild rabbits include strong admonitions not to handle such game without gloves, and to be sure to burn all fur and other offal. While the normal mode of transmission is by means of the bite of a rabbit flea, tularemia can easily enter the human system directly, through a cut or scratch on the skin.

Rats are the chief carriers of typhus fever. In this country the germs are implanted in human beings by chance bites of rat fleas. In the Old World, it is the body louse that serves as the introducing agent. Recently, rats have taken to stealing long rides on cross-country trucks, and it is claimed that typhus is increasing rapidly in the Southeast as a consequence.

Rats, again, are the horses on which the plague called bubonic chiefly rides, and the bites of their fleas transmit the infection to human beings. However, many other species of rodents, especially the attractive little ground squirrels in California, have now become reservoirs of the plague. California is really more in dread of the possibility of this visitation than it is of any imaginable earthquake.

Combating rodent-borne diseases by exterminating all rodents is simply beyond practicability. Something can be done to create rodent-free zones around human settlements, but the cost and effort involved in killing all rabbits, all rats and all ground squirrels simply staggers the imagination. Different lines of defense will have to be found.

Science News Letter, November 16, 1940

PHYSIOLOGY

Study of Sex Cycle Advanced By Grafting Uterine Tissue

BETTER knowledge of the female sex cycle, one of the most important yet least understood of all physiological phenomena, has been achieved by Prof. Joseph E. Markee of Stanford University, through the simple device of making a sample of uterine tissue grow outside the body, where it can be watched, instead of inside, where continuous observation is of course impossible. Results of the researches, which have been going on for twelve years, have been published by the Carnegie Institution of Washington.

Prof. Markee chose as his subject the common rhesus monkey because its sex physiology is quite similar to that of human beings. In particular, the length of the oestrus cycle is the same—28 days in both species.

Pieces of the uterine tissue were grafted onto the eyeballs of a number of female animals. Regularly every four weeks, these pieces of tissue, under control of the same gland secretions that start and carry through the normal female sex cycle, did the same things that the original tissue in the lining of the uterus was doing. They grew, degenerated, and bled, and all the while they could be closely observed through microscopes trained on the grafted spots. Observation was made the easier in that the monkeys apparently suffered no discomfort or pain.

To hold a monkey's head still while he watched it, Prof. Markee devised a box with a hole fitting around the little animal's neck. It was more or less like a miniature steam-bath cabinet—except that it wasn't hot. The monkeys were easily trained to pop their heads through the holes, and to sit there while the physiologist, with his special microscope, scrutinized the all-important tissue grafts on their eyes.

Many of Prof. Markee's observations confirm what has been conjectured about the changes in the uterine wall during the monthly cycle, though some of them will necessitate changes in pre-existent notions. And all of them have added a wealth of detailed information which has previously been lacking.

Thus far, only the course of the normal female sex cycle has been studied, for of course departures from normal can be better understood and dealt with medically if the norm of good health is first firmly established. The technique, however, lends itself readily to pathological studies if these should appear desirable.

Science News Letter, November 16, 1940

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Additional Reviews On Page 320

ANTHROPOLOGY

AN EXHIBITION OF MASKS, Occult and Utilitarian—*Cranbrook Institute of Science,* 22 p., illus., 20c. From Stone Age rites to present war defense and industrial safety, the idea of hiding the face behind a mask has served many purposes. Those who cannot visit Bloomfield Hills, Michigan, to see the Cranbrook Institute's current exhibit may find much of interest in this nicely illustrated guide article.

Science News Letter, November 16, 1940

ECONOMICS

VENEZUELA, A Democracy—Henry J. Allen—*Doubleday, Doran,* 289 p., illus., $3.50. What Venezuela is like—its resistance to totalitarianism, its experiments in progressive education, its social and economic adjustments—is told with journalistic vigor and political insight by Mr. Allen, a former governor of Kansas and special adviser to the State Department.

Science News Letter, November 16, 1940

RECREATION—ETHNOLOGY

LET'S CELEBRATE CHRISTMAS—Horace J. Gardner—*Barnes,* 212 p., $2.50. Starting out with custom and tradition of Christmas in many lands, this unusual book goes on to plan Christmas parties from games to refreshments (recipes included), provides poems, carols and stories for the season and even two one-act Christmas plays.

Science News Letter, November 16, 1940

BOTANY

STUDIES OF CENTRAL AMERICAN PLANTS, I—Paul C. Standley and Julian A. Steyermark—*Field Museum of Natural History,* 100 p., 75c.

Science News Letter, November 16, 1940

ANTHROPOLOGY

NOTES ON SKIDI PAWNEE SOCIETY—George A. Dorsey and James R. Murie—*Field Museum of Natural History,* 52 p., 40c.

Science News Letter, November 16, 1940

RADIO

FESSENDEN, Builder of Tomorrows—Helen M. Fessenden—*Coward-McCann,* 362 p., $3. A sympathetic biography of a famous radio pioneer, written by his widow.

Science News Letter, November 16, 1940

SOCIOLOGY

SUMNER TODAY, Selected Essays of William Graham Sumner, with Comments by American Leaders—Maurice R. Davie, ed.—*Yale Univ. Press,* 194 p., $2.50. Re-printing the social philosophy of an influential teacher, whose life span ran from 1840 to 1910, the editors have given the Sumner ideas historic perspective by asking present-day individuals to comment, following each essay. Some of this group of commentators stress the obsolete, more are impressed by current aptness in Sumner sociology.

Science News Letter, November 16, 1940

TECHNOLOGY

FACTORY VENTILATION IN THE BLACKOUT—Gt. Brit. Factory Dept., Home Office—*Brit. Library of Information,* 17 p., 10c. These suggestions, fortunately, are not now needed in the United States, but they might be useful to some one who is interested in providing proper ventilation for a photographic darkroom.

Science News Letter, November 16, 1940

CHEMISTRY

ORGANIC REAGENTS USED IN QUANTITATIVE INORGANIC ANALYSIS — Wilhelm Prodinger; Stewart Holmes, trans. — *Nordemann,* 203 p., $5. The first German edition of this work appeared in 1937, and the second in 1939. This translation, from the latter, will make its useful data available to chemists in English-speaking countries.

Science News Letter, November 16, 1940

HISTORY

THE BRIDGE OF WATER, The Story of Panama and the Canal—Helen Nicolay—*Appleton-Century,* 295 p., illus., $2. For young readers, Miss Nicolay skillfully builds the history of America's important Panama Canal area, from the discovery era when "pepper began it" to the present. Very attractive black and white illustrations are by Chichi Lasley.

Science News Letter, November 16, 1940

GEOGRAPHY

1940 YEARBOOK, Park and Recreation Progress—U. S. National Park Service—*Govt. Print. Off.,* 92 p., illus., 35c. Contains informative articles with illustrations, in addition to the report of a year's progress, and a current bibliography.

Science News Letter, November 16, 1940

EMBRYOLOGY

DEVELOPMENTAL ANATOMY, A Textbook and Laboratory Manual of Embryology (4th ed.)—Leslie Brainerd Arey—*Saunders,* 612 p., illus., $6.75. New edition of a successful text for advanced courses in embryology.

Science News Letter, November 16, 1940

HISTORY

THE CARIBBEAN DANGER ZONE—J. Fred Rippy—*Putnam's,* 296 p., $3. Caribbean policy of the United States and the historic and diplomatic developments that have shaped the situation up to now are discussed in this interpretative volume. Politicians of both the United States and Caribbean countries have been guilty of some unpatriotic maneuvers in the past, Prof. Rippy finds, and he warns now that this "most vital area" requires a solid defense by its neighbors.

Science News Letter, November 16, 1940

ZOOLOGY

THE ANATOMY OF THE CAT—Richard R. Stuart—*Denoyer-Geppert,* 32 p., illus., 50c.

THE ANATOMY OF NECTURUS MACULOSUS, The Mud Puppy—Richard R. Stuart—*Denoyer-Geppert,* 28 p., illus., 50c. Laboratory manuals for the first-year course in zoology.

Science News Letter, November 16, 1940

MATHEMATICS

A COURSE OF ANALYSIS (2d ed.)—E. G. Phillips — *Cambridge (Macmillan),* 361 p., $4. The second edition of this technical treatise is largely a reproduction of the first (1930), only some minor changes in correcting a few errors and clearing certain obscurities having been made.

Science News Letter, November 16, 1940

MATHEMATICS

A STUDY OF THE PROBLEMS IN TEACHING THE SLIDE RULE—Carl N. Shuster—*Teachers College, Columbia Univ.,* 103 p., $1.85. With the "slip-stick" so important in engineering, science and business, it is rather surprising that up to now there has been no experimental study in English of methods for teaching its use. The vacancy has now been ably filled by this book, which will be of interest not only to teachers, but to anyone who uses, or wants to use, a slide rule.

Science News Letter, November 16, 1940

AERONAUTICS

WIN YOUR WINGS, Book I—Roscoe Turner and Jean H. Dubuque—*Drake,* 649 p., illus., $3.50. Intended as a primary aviation training manual, this work covers elementary principles of flight, meteorology, navigation, and Civil Air Authority regulations. An aeronautical dictionary is included.

Science News Letter, November 16, 1940

First Glances at New Books

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GENERAL SCIENCE

THE SOUL OF THE UNIVERSE—Gustaf Strömberg—*McKay,* 244 p., $2. One of the leading astronomers at the Mt. Wilson Observatory has applied the quantum theory and the theory of relativity to the age-old problem of the relationship between mind and matter. He comes to the conclusion that "the individual memory is probably indestructible and that the essence of all living elements is probably immortal." The study, according to the author, "leads to the inevitable conclusion that there exists a World Soul or God."

Science News Letter, November 16, 1940

BOTANY

ILLUSTRATED FLORA OF THE PACIFIC STATES, Vol. I, Ophioglossaceae to Aristolochiaceae, Ferns to Birthworts—LeRoy Abrams—*Stanford Univ. Press,* 538 p., illus., $7.50. New printing on better paper at a reduced price. The publisher will accept copies of the first printing for $3 credit toward the purchase of the new copy. Such exchanges must be sent directly to the publisher at Stanford University, Calif. Volume II (Buckwheats to Kramerias) will be published in December, and volumes III and IV are in preparation.

Science News Letter, November 16, 1940

GENERAL SCIENCE

ENGINES OF DEMOCRACY, Inventions and Society in Mature America—Roger Burlingame—*Scribner,* 606 p., illus., $3.75. The rise of American technology and industry with a strong background of economics and sociology is told by the author of "March of the Iron Men." It makes significant and enlightening reading. A conclusion: "The history of United States is fundamentally a history of invention."

Science News Letter, November 16, 1940

HISTORY—ECONOMICS

THE MINGLING OF THE CANADIAN AND AMERICAN PEOPLES. Vol. 1, Historical—Marcus Lee Hansen—*Yale Univ.,* 274 p., $3. Solid and competent groundwork for the increasing cooperation between our neighbors to the North and ourselves.

Science News Letter, November 16, 1940

GENERAL SCIENCE

EXPLORING OUR WORLD—Samuel Ralph Powers, Elsie Flint Neuner, Herbert Bascom Bruner and John Hodgdon Bradley—*Ginn,* 495 p., illus., $1.28. One of a trilogy of texts for grades seven, eight and nine, themed on the idea that living things, including man, are dependent on each other and on their physical environment. This volume is for the 7th grade.

Science News Letter, November 16, 1940

GENERAL SCIENCE

SCIENCE AND EVERYDAY LIFE—J. B. S. Haldane—*Macmillan,* 284 p., $2. Seventy articles by an effective British scientist and popularizer. They have previously appeared in a British newspaper.

Science News Letter, November 16, 1940

ARCHITECTURE

THE BOOK OF LOW COST HOUSES—The Architectural Forum Editors—*Simon and Schuster,* 128 p., illus., $1. Many practical suggestions, with plans, specifications, etc. are given for nearly a hundred houses, costing from $1200 to $7500.

Science News Letter, November 16, 1940

BIBLIOGRAPHY

BOOKS FOR TIRED EYES, A List of Books in Large Print (3rd ed.)—Charlotte Matson and Dorothy Wurzburg—*Amer. Library Assn.,* 79 p., 65c.

Books for adults and books for children, all in 12 point type (this big) or larger.

Science News Letter, November 16, 1940

AERONAUTICS

FIGHTING PLANES OF THE WORLD—Bernard A. Law—*Random House,* 66 p., illus., $1. Sixty-five beautiful illustrations in color show the principal types, not only those in the fleets of the warring countries, but also in the ones that are still at peace.

Science News Letter, November 16, 1940

MATHEMATICS

AN INTRODUCTION TO ABSTRACT ALGEBRA—Cyrus Colton MacDuffee—*Wiley,* 303 p., $4. Intended as a textbook for beginning graduate students, this work includes some facts from number theory, group theory and formal algebra, to provide a background for understanding the generalized facts of abstract algebra.

Science News Letter, November 16, 1940

ZOOLOGY

ESSENTIALS OF ZOOLOGY, Emphasizing Principles of Animal Biology—George Edwin Potter—*Mosby,* 526 p., illus., $3.75. A new textbook, by the professor of biology at Texas A. and M. College.

Science News Letter, November 16, 1940

EXPLORATION

CENTENARY CELEBRATION, The Wilkes Exploring Expedition of the United States Navy 1838-1842 and Symposium on American Polar Exploration—*Amer. Philosophical Soc.,* 331 p., illus., $2.50 (Proceedings, Vol. 82, No. 5). On February 23 and 24, 1940, the American Philosophical Society celebrated the centenary of our first national exploring expedition, in which it played an important part. The papers presented, here published, provide a valuable summary of the results of that expedition and the important work done in the following century by polar explorers from the United States.

Science News Letter, November 16, 1940

RADIO

THE RADIO AMATEUR'S HANDBOOK (8th ed.)—A. Frederick Collins; E. L. Bragdon, rev.—*Crowell,* 341 p., illus., $2. This new edition brings up to date a book which tells how to make, operate and repair your own radio. Television, frequency modulation and radio facsimile are included.

Science News Letter, November 16, 1940

CHEMISTRY

LABORATORY MANUAL OF ELEMENTARY ORGANIC CHEMISTRY—George H. Richter—*Wiley,* 128 p., diagrams, $1.25. This manual is written to appeal particularly to students of the biological sciences, and includes the preparation of such modern compounds as sulfanilamide and prontosil.

Science News Letter, November 16, 1940

PHOTOGRAPHY

WALL'S DICTIONARY OF PHOTOGRAPHY (15th ed.)—F. J. Mortimer, ed.; A. L. M. Sowerby, rev.—*Amer. Photographic Pub. Co.,* 701 p., illus., $2.50. This 1940 edition of a valuable reference work that first appeared more than half a century ago takes into account many of the important advances of recent years.

Science News Letter, November 16, 1940

PHYSICS

INTRODUCTION TO POLARIZED LIGHT AND ITS APPLICATION—Martin Grabau—*Polaroid Corp.,* 46 p., illus., 50c. This little booklet, listing a variety of polarized light experiments which are now easily possible with Polaroid film, will be especially valuable to students and teachers. Many novel uses of this fascinating material are suggested.

Science News Letter, November 16, 1940